UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte SRINATH HOSUR, SRIKANTH GUMMADI,
ANUJ BATRA, and DAVID P. MAGEE

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Appeal 2009-002503
Application 10/755,603
Technology Center 2600

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Decided: June 22, 2010

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Before KENNETH W. HAIRSTON, THOMAS S. HAHN, and
BRADLEY W. BAUMEISTER, *Administrative Patent Judges.*

BAUMEISTER, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 1-24. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Appellants' invention relates to multiple-input, multiple-output (MIMO) transmitters used for the wireless communication of data between a client and base station or between two wireless clients (Spec. 1). More specifically, the invention is directed to a time-switched preamble generator and a method of generating a data transmission preamble (Spec. 1-4). This data transmission preamble includes a training sequence called a long sequence (Spec. 4).

Independent claim 1 is illustrative, reading as follows (emphasis added to disputed claim language):[1]

> 1.   A time-switched preamble generator for use with a multiple-input, multiple-output (MIMO) transmitter employing first and second transmit antennas, comprising:
>
> an initial preamble formatter configured to provide a first preamble to said first transmit antenna and a second preamble to said second transmit antenna during an initial time interval;
>
> a subsequent preamble formatter coupled to said initial preamble formatter and configured to provide said second preamble to said first transmit antenna and said first preamble to said second transmit antenna during a subsequent time interval; and
>
> *wherein at least one of said first preamble and said second preamble employs a complete training sequence.*

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[1] Independent claims 9 and 17 are the only other independent claims on appeal. Claim 9 also recites "a complete training sequence." Claim 17 alternatively recites "an undivided training sequence."

1.   Claims 1-3, 5, 6, 9-11, 13, 14, 17-19, 21, and 22 stand rejected under 35 U.S.C. § 112, ¶ 1, as failing to comply with the written description requirement.

2.   Claims 1-24 stand rejected under 35 U.S.C. § 103(a) as obvious over various combinations of Suh (US 2004/0136464 A1; Jul. 15, 2004), Nakao (US 2002/0057750 A1; May 16, 2002), and Li (US 7,110,350 B2; Sep. 19, 2006).[2]

More specifically, the Examiner had initially rejected at least claims 1-3, 7-11, 15, and 16 as anticipated by Suh (Non-Final Rejection mailed Jan. 25, 2007, at 2) and rejected the remaining claims as obvious over Suh and Nakao or Li (*id.* at 4-7).[3] In response to the rejections, Appellants amended independent claims 1 and 9 by adding the limitation, "wherein at least one of said first preamble and said second preamble employs a *complete* training sequence," and amended independent claim 17 by adding the limitation "wherein at least one of said first preamble and said second preamble employs an *undivided* training sequence" (*see* Amendment filed April 24,

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[2] The Examiner does not clearly set forth which references are being relied upon in rejecting the various claims. For example, the Examiner states that (1) claims 1-3, 7-11, 15, and 16 are rejected as obvious over Suh alone (Ans. 4); (2) claim 4 is rejected over Suh and Nakao (Ans. 7); and (3) claims 5 and 6 are rejected over Suh and Li (*id.*). However, the Examiner alternatively states in the body of the rejection over Suh alone that "[c]laims 9-16 are rejected for the same reason as set forth in claims 1-8[,] and claim [sic: claims] 18-24 are rejected for the same reason as set forth in claims 2-8" (*id.*). The Examiner further indicates that independent claim 17 is also rejected over Suh and Li (Ans. 8-10).

[3] *But cf.* Non-Final Rejection mailed Jan. 25, 2007, at 4:3-4 (stating that "[c]laims 9-16 are rejected for the same reason as set forth in claims 1-8[,] and claim [sic: claims] 18-24 are rejected for the same reason as set forth in claims 2-8").

2007 (emphases added)). Appellants argued (1) that these amendments overcame all of the rejections based upon Suh because "Suh discloses dividing a training sequence into even data (in a first preamble sequence) and odd data (in a second preamble sequence) for transmission by two different antennas" (*id.* at 8); and thus, (2) Suh does not teach or suggest either a complete training sequence or an undivided training sequence, as required by the claims (*id.* at 9).

Based upon Appellants' amendment, the Examiner then modified the earlier position, changing the anticipation rejection over Suh to an obviousness rejection by (1) acknowledging that Suh does not disclose employing a complete training sequence for at least one of the first and second preambles (Ans. 5:21 – 6:2); (2) conversely asserting that Suh does additionally teach "wherein at least one of said first preamble and said second preamble employs a compete training sequence" (Ans. 6:3-5); and (3) alleging, as motivation for why it would have been obvious to modify Suh's training sequences so as to be complete or undivided, "in order to provide both increased robustness and capacity" (Ans. 6:6-8).

We understand the Examiner's position, then, to be that (1) one portion of Suh discloses one protocol that uses *short* sequences in an initial preamble formatter during an initial time interval and a subsequent preamble formatter during a subsequent time interval; (2) a different protocol of Suh uses a *long* sequence; and (3) it would have been obvious to have used the disclosed long sequence, in some unspecified manner, within the two time intervals of the first protocol. We understand the Examiner's motivation for this modification to be for the purpose of achieving "increased robustness and capacity" (*id.*).

With respect to the written description rejection, Appellants argue that
35 U.S.C. § 112, ¶ 1, does not require *in haec verba* support, and that their
originally filed Specification, does, in fact, provide adequate support for the
terms "complete" and undivided" that were added to the claim language,
"training sequence," of independent claims 1, 9, and 17 (App. Br. 7-9; Reply
Br. 2).

With respect to the art-based rejections, Appellants do not dispute
whether Suh discloses long sequences generally (*see, e.g.*, App. Br. 9).
Rather, they argue that, even assuming *arguendo* that Suh does disclose a
complete sequence S(-100:100), it does not teach transmitting preambles
during both initial and subsequent time intervals – Suh only teaches mapping
sequence S(-100:100) in the long preamble sequence period and then ending
the procedure (App. Br. 9-10 (citing Suh, ¶¶ 62-70, 101-102, 105-107; Fig.
7, Step 717; Fig. 8, Step 817)). Appellants urge, then, that Suh does not
teach or suggest each element of independent claims 1 and 9, and the
Examiner fails to provide a prima face case of obviousness for these claims
(App. Br. 10). Appellants further argue in relation to independent claim 17
that Li does not cure this deficiency (App. Br. 13).

FINDINGS OF FACT

Appellants' Specification

1.   "In IEEE 802.11(a), a training sequence, called a long sequence, is
employed as part of a preamble to the transmission of data. This long
sequence involves the transmission of a known sequence of vector symbols .
. . " (Spec. [0006]).

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"In a [multiple-input, multiple-output] MIMO transmission, two training sequences (i.e., IEEE 802.11(a) long sequences) may be employed as part of a preamble transmission by each of the first and second transmit sections TSI, TS2 to establish an estimate of the communication channel" (Spec. [0022]).

> In one embodiment of the present invention, a training sequence (i.e., an IEEE 802.11(a) long sequence) is employed as the first preamble to the first transmit antenna T1, and a null is employed as the second preamble to the second transmit antenna T2, wherein the preambles occur during the initial time interval. . . .

> In an alternative embodiment, the first preamble to the first transmit antenna T1 employs a first training sequence and the second preamble employs a second training sequence that is orthogonal to the first training sequence.

(Spec. [0024] – [0025]).

Suh

2. The preamble sequence is classified into a long preamble sequence and a short preamble sequence. In the long preamble sequence, a length-64 sequence is repeated 4 times and a length-128 sequence is repeated 2 times, and in the light of a characteristic of the [orthogonal frequency division multiplexing] OFDM communication system, a cyclic prefix is added to a front part of the 4 repeated length-64 sequences and a front part of the 2 repeated length-128 sequences. Further, in the short preamble sequence, a length-128 sequence is repeated 2 times, and in the light of a characteristic of the OFDM communication system, the cyclic prefix is added to a front part of the 2 repeated length-128 sequences.

(Suh, ¶ [0076]).

ANALYSIS

I.

We agree with Appellants that the originally filed Specification provides adequate support for both terms, "complete training sequence," as required by independent claims 1 and 9, and "undivided training sequence," as required by independent claim 17. As noted by Appellants, 35 U.S.C. § 112, ¶ 1, does not require *in haec verba* support. Rather, support for later-added claim language can be expressly, implicitly, or inherently supported in the originally filed disclosure. In the present case, one of ordinary skill in the art would reasonably conclude that Appellants have specifically defined the term "training sequence" to mean the entire portion of a long sequence (Fact 1). We also find that the term "long sequence" has an art-recognized meaning (Facts 1 and 2). Furthermore, the Examiner has not asserted any other potential meanings that could be reasonably attributed to either "complete training sequence" or "undivided training sequence" (*see* Ans. 3-4). Accordingly we do not sustain the Examiner's decision to reject claims 1-3, 5, 6, 9-11, 13, 14, 17-19, 21, and 22 under 35 U.S.C. § 112, ¶ 1.

II.

Regarding the obviousness rejections, we understand Appellants' position (*see* App. Br. 9-10) to be as follows: (1) Suh discloses a procedure wherein short sequences, P(-100:100) and Pg(-100:100), are variously transmitted to first and second antennas at initial and subsequent time intervals; (2) Suh separately discloses a procedure wherein a long sequence, S(-100:100), is transmitted to the two antennas, but only during a single, leading preamble sequence period; and (3) Suh's express disclosure of these

two procedures, and only these two procedures, does not reasonably further imply that the long sequence would have also been considered useful in a modification of the procedure that transmits the short sequences to the two antennas at the separate time intervals.

We find persuasive Appellants' argument that the Examiner has not established a prima facie showing of obviousness (App. Br. 9-10). The Examiner has not set forth how Suh's procedure of variously transmitting the short sequences of subdivided odd and even subcarriers during different time intervals could be modified so as to use a long sequence, or alternatively how a complete long sequence could be modified so as to be used within this procedure that employs short sequences. The Examiner has merely alleged that this non-described modification would have the alleged benefit of "increased robustness and capacity" (Ans. 6). However, this proffered motivation is merely conclusory, and the Examiner has not pointed to any evidence in Suh or elsewhere to support this assertion.

Accordingly, we will not sustain the Examiner's obviousness rejection of independent claims 1, 9, and 17. Likewise, we will not sustain the Examiner's obviousness rejection of dependent claims 2-8, 10-16, and 18-24, which depend from these independent claims. Furthermore, as the Examiner has not alleged that either of the additional references, Nakao and Li, provide reasonable motivation to modify Suh in the manner proposed for at least claim 1, we do not sustain the Examiner's rejection of claims 1-24, regardless of what combination of Suh, Nakao, and Li the Examiner had intended to base each claim's obviousness rejection upon.

DECISION

We reverse the Examiner's decision rejecting claims 1-24.

REVERSED

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